The Semites received the hieroglyphics from their inventors after they had already assumed a cuneatic form, and added still further to the heritage. When the Semitic king Sargon I. was reigning in Babylonia in B.C. 3800, the scribes at his court were still occupied in devising new forms of characters, and in increasing the number of phonetic values the student was required to learn. This is the cause of the fact pointed out by Prof. de Lacouperie, that, whereas most of the cuneiform characters have to be turned on their sides in order to be restored to their primitive position (Chaldæan writing having once been traced (in vertical columns), there are other characters which have never been thus displaced. As time went on, the forms of the characters became more and more distorted; the number of persons in Babylonia who could read and write was very large, and while the general form of script varied from age to age, the individual in each age was distinguished by a peculiar form of handwriting as much as is the individual of to-day. An official scrip- never prevailed in Babylonia as it did in Assyria, where education was practically confined to the class of scribes; and while, therefore, the Assyrian student has little need of learning more than one form of writing as long as he confines himself to the monuments of Assyria, he is bewildered by the number of cursive hands which the documents of Babylonia oblige him to decipher.

The oldest Babylonian monuments yet known are those discovered by the French Consul M. de Sarzec at Telloh in Southern Babylonia. They are earlier than the epoch of Sargon I., and belong to the pre-Semitic era. The inscriptions engraved upon them still preserve in some measure the old vertical arrangement of the characters, and in some few cases the characters themselves have a pictorial form. But more generally they have already become cuneatic, and not unfrequently have departed so widely from their primitive appearance as to make it impossible even to guess what they were primarily intended to represent. If this were the case in the fourth millennium before our era, we may have some idea of the vast antiquity to which the beginnings of Babylonian writing must reach back.

In other instances, though the transformation of the character is not so complete, it is difficult to determine with certainty the object originally portrayed. Some of Prof. de Lacouperie's examples are in this plight, and as regards at least two of them—those pronounced *da* and *du* or *tur*—I prefer the explanations suggested by Mr. Pinches and Mr. Bertin to those suggested by himself. In fact, in the first case he has misinterpreted, like the earlier Assyriologists, the Assyrian explanation of the ideograph *nasu sa nisi;* which signifies, not "the summit of man," but "the lifting up of a man." It is consequently natural to regard it as representing the uplifted arm.

Prof. de Lacouperie rejects the theory which saw in the mountains of Elam the birth-place of Babylonian writing. Whatever, however, may be the value of the arguments urged by the advocates of this theory, the arguments brought against it by Prof. de Lacouperie do not appear to me to be cogent. Certainly it is not my experience that the coast of a flat country like Chaldæa "always looks mountainous" to the seafarer; while the Accadian word *a* (misprinted *ai*) signifies "father," not because of the ideographic meaning of the character which represented it, but because the Accadian *ada*, "father," became in pronunciation, through phonetic decay, first *ad*, and then *a*. The symbol of "country" attached to the ideographs of "man" or "servant," "handmaid" and "wild ox," need not have been introduced before the Accadians had long been settled in the Babylonian plain, and it is not quite correct to say that "while [Babylonian writing] possesses primitive symbols for 'boat' and for 'wind,' represented by an inflated sail, there are none for 'river.'" Both "ship" and "river" are alike denoted by a double ideograph.

The question, however, whether the cuneiform system of writing originated in "the mountains of the East," as the Babylonians called them, or in the islands of the Persian Gulf, does not affect Prof. de Lacouperie's main contention. If this can be established, a new and important chapter will be opened in the history of the ancient East, and the mystery which has so long enveloped the origin of the Celestial Empire will be cleared away. I must leave it to the Sinologists to determine whether, on the Chinese side, Prof. de Lacouperie's conclusions are sustainable; on the Babylonian side, he has nothing to fear from Assyrian scholars.

A. H. SAYCE.

DR. EIMER ON THE ORIGIN OF SPECIES.

Die Entstehung der Arten auf Grund von Vererben erworbener Eigenschaften nach den Gesetzen organischen Wachsens. Von Dr. G. H. Theodor Eimer, Professor der Zoologie und vergleichenden Anatomie zu Tübingen. (Jena: Gustaf Fischer, 1888.)

IT is a little curious that, although Darwin was so much more an experimenter than an anatomist, the immediate stimulus of his work was to anatomy, and not to experiment. There is, however, ample evidence that morphology is beginning to advance on the lines prophesied for it at the end of the "Origin of Species," and that morphologists are to enter the "almost untrodden field of inquiry on the causes and laws of variation, on correlation, on the effects of use and disuse, on the direct action of external conditions."

Dr. Eimer's book is written from the stand-point of one who believes that there is more to be made out of the study of the influence of the environment on a single set of organisms than of the anatomy and microscopy of many organisms. It is an abundant storehouse of facts, old and new, about the influence of the physical environment. Many curious problems are dealt with, and the infinite fertility of the field of investigation is shown. But the book claims to be far more than this: it claims to supply a new theory of the organic world—a theory in which natural selection plays only a casual and incidental part.

Dr. Eimer starts from the premiss that natural selection is insufficient to account for the evolution of the organic world because it is essentially the rule of chance. One had thought that this misconception had, even in the controversy of the ignorant, long ago died of inanition. Not only is the whole tenour of Darwin's book opposed to such a conception, but Darwin has specifically guarded against it. For him and for his theory "chance" is but a convenient way of denominating processes of whose details, from their complexity or from their intricacy, we are ignorant.

From his study of the life-conditions of some lizards, Dr. Eimer has reached the conclusion that at any given time variations occur only in a few definite directions. These directions depend on inner constitutional causes. The variations are produced by the direct action of the environment, are always transmitted, and when accumulated, become the inner constitutional cause determining the direction in which the organism will respond to new stimuli. In old males which have been subjected for a longer time than other forms to the environment there is a tendency to the appearance of new characters. These show the direction in which species-variation is going to take place. Not only does the ontogeny repeat the phylogeny in a condensed form, but the later stages of the ontogeny are prophetic of the new phylogeny. Variation, so directed and limited, assimilation causing growth, and reproduction or discontinuous growth, are the chief laws of organic growth.

Suppose a primitive undifferentiated plasma capable of responding to stimuli of heat, light, moisture, &c. In response to the action of the environment ever slightly varied in such details, various conditions would "crystallize out" of the plasma, just as from a homogeneous inorganic mass crystals form in varied groups. As the organic world continued to grow, this original differentiation would increase. With increase of complexity due to the storage in each generation of the complete effect of the environment on each stage of the phylogeny, the different directions in which forms were developing would become more different. Each new character appearing would through correlation influence the whole organism. Allow a little to natural selection and a little to the results of sexual mingling, and the varied species, orders, and classes into which the organic world can now be divided appear as the inevitable result of its mode of growth. There is no need to search for intermediate forms: they may never have existed. As the branching of a tree is the natural consequence of its mode of growth, so is separation and isolation inevitable in the whole organic world.

The two crucial points in Dr. Eimer's theory are his view of the action of the environment and his extreme Lamarckian acceptance of the transmission of acquired characters. Probably he is correct in his supposition that the extent of the direct action of the environment has as yet been unappreciated. Many characters hitherto unexplained may come to be referred to direct action, and experiment only can determine its scope. But it is no explanation of the presence of chlorophyll to refer it with the author to the continued action of sunlight upon protoplasm. And still less is it an explanation of the difference between queen and worker bee to refer it to the difference in their food. But indeed in this latter case the refutation of the author is easy. The neuter is not a different kind of bee produced by a different kind of food. It is merely an arrested queen—a queen that has not become something else on account of a different diet, but a queen that is not quite a queen because it has not had enough to eat. That this is the true state of the case is apparent from the less specialized colonies of wasps. There the queen in spring lays female eggs, and has herself to forage for the whole brood. As a result the young do not get enough to eat, and the development of their sexual organs is arrested. They in turn help to feed the next brood, the individuals of which reach a further state of development. As the summer wears on, the ever-increasing band of workers bring in an increasing supply of food, till finally a condition is reached when there is enough food to make perfect females of a whole brood. Clearly the bee colony, with its sharper distinction between neuter and queen, is merely a specialization of this condition. It is but a verbal explanation of the difference between queen and neuter to refer it to the direct action of food upon the organism. Moreover, to explain the condition of things even in the wasp colony, natural selection is necessary. Obviously, insufficient food would arrest general development as well as sexual development, and natural selection acting on variations naturally arising had to select those whose genitalia suffered most with least detriment to general powers. From the many interesting cases adduced by the author, this one has been selected because it is fairly typical of the slight grounds on which he refers important characters to the direct action of the physical environment.

As for the inheritance of acquired characters, it may be said at once that Dr. Eimer has added nothing of importance to the controversy. He certainly has adduced a few isolated cases that seem to be explained best on this theory; and were the inheritance of acquired characters merely of incidental value to his argument, his easy acceptance of the traditional view might avoid criticism. But when it is said that the direct action of the environment, together with inner constitutional causes, produces varieties and species, and that these inner constitutional causes that determine the direction of variation are merely a summation of direct action, a summation effected by inheritance, we perceive at once that a new and all-important *rôle* is assigned to heredity. There is no attempt to meet the serious theoretical difficulties involved in every conception of the mechanism of the inheritance of acquired characters: there is no adequate attempt to establish the fact. Were it possible and were it true, undoubtedly it would be, as Dr. Eimer in elaborate and learned detail has shown, of immense importance. But to prove its possibility or truth Dr. Eimer has done little or nothing.

Dr. Eimer appears to have mistaken a generalized expression of the process of evolution for an explanation of it. Natural selection acts at a time only on the one or two characters which the environment temporarily elevates into criteria of existence. But, as these change, there are changed with them a vast multitude of minor characters—in a word, there results what the author happily calls "kaleidoscopic variation." These changes can be referred only indirectly to selection, though they may play no inconsiderable part in determining the appearance of the organism. With all these variations are correlated variations in the results produced by the direct physical action of the environment.

Dr. Eimer has concentrated his attention on these secondary and certainly neglected changes, and his theory is a statement of their course. But he has brought forward no motive power to take the place of natural selection in determining the ruling changes; and there-

fore his generalized statement, even when raised into a law and dignified with a name, is not an explanation of the phenomena. Darwin has convinced men of evolution where Lamarck failed and where certainly Dr. Eimer would fail, not because he discovered any law, but because he discovered an intelligible mechanism, an obvious sequence of cause and effect, which could, and probably did, act.
P. C. M.

OUR BOOK SHELF.

The Birds of Dorsetshire: A Contribution to the Natural History of the County. By J. C. Mansel-Pleydell, B.A., F.L.S., &c. 8vo. pp. i-xvi., 1-179. (London and Dorchester: R. H. Porter, 1888.)

Notes on the Birds of Herefordshire, contributed by Members of the Woolhope Club. Collected and Arranged by the late Henry Graves Bull, M.D., &c. pp. i-xxxii., 1-274. (London and Hereford: Jakeman and Carver, 1888.)

COUNTY lists of birds are still the order of the day. First we have Mr. Mansel-Pleydell's book on the Ornithology of Dorsetshire, a very neat little volume, compiled evidently with the greatest care. The author's long acquaintance with the country and his well-known love of natural history have rendered him the most competent authority on the subject, and he has been aided by many well-known naturalists in supplying him with instances of the capture of rare birds, so that the list is a very complete one. The inevitable Great Black Woodpecker (*Picus martius*) of course appears, on Pulteney's authority, but no recent specimen is extant, nor is likely to be. The Pied-billed Grebe (*Podilymbus podiceps*), which was first recorded by ourselves as a British bird, is placed between brackets, and considered to be "extremely doubtful" by the author. All we can say is that we should not have been godfather to the specimen, to add one more doubtful species to the already overburdened British list, unless we had felt tolerably certain of its authenticity, while the fact of the specimen being immature renders its occurrence as a chance wanderer much *more* probable than if it had been an adult bird in breeding-plumage. The bird has ten times more claim to a place amongst our stragglers than such species as *Picus medius*, *Pycnonotus barbatus*, and dozens of others. A most interesting history is given of the celebrated swannery at Abbotsbury, with a photographic plate, in which the birds are well depicted, but the keeper's face lacks expression! Some pretty woodcuts by Mr. Lodge are interspersed in the text. The author informs us that *Puffinus obscurus* (p. 113) should be *P. griseus*.

Dr. Bull's "Birds of Herefordshire" is one of the most useful of the county lists; for it contains a complete list of British birds, with special notes on the Herefordshire species. A great deal of care has evidently been taken over this book, which is rendered more interesting by the poetical researches of the author. Mr. Phil. Robinson, when he issues a new edition of his "Poets' Birds" will certainly have to consult this work of Dr. Bull, which contains many quotations we have not seen elsewhere.
R. BOWDLER SHARPE.

Geology for All. By J. Logan Lobley, F.G.S., &c. (London: Roper and Drowley, 1888).

THE object of this little book is to give an account of the important facts and deductions in geology, without "unnecessary scientific terminology." That there is room for such a work will not be questioned, and doubtless many who have paid no heed to the subject would begin to study it if only their lessons were made easy and attractive. This was accomplished in old times by Hugh Miller, and more recently by Canon Kingsley in his charming "Town Geology"; and Mr. Lobley, in his enthusiastic preface, raises the hope that he will follow a similar course, and provide "all intelligent readers" with a simple record of the earth's history. In this respect, however, we are disappointed. The work is a condensed account of the leading geological facts and deductions, arranged much after the fashion of an ordinary text-book. Of its general accuracy and clearness we can speak with confidence; and indeed, through his long connection with the Geologists' Association, the author has had ample opportunities of qualifying himself for his task. The work, however, is more adapted for the young student who wishes to pursue the subject, than for the general reader. We fear the patience of the latter will be tried when he reads the explanations—and not always happy explanations—of outcrops, anticlinals, unconformities, and outliers, for there are no diagrams to give pictorial aid. Nor is the chapter on the composition of rocks likely to prove more readable; for surely the accounts of the physical characters of minerals, and the chemical formulæ, introduce "unnecessary scientific terminology." Again, when we read of the acidic and basic rocks, of the seismic focus and the meizoseismic curve, of the "homocircle (*sic*) or equal-lobed tailed fishes," and of those that present a "heterocircle-tailed character," we feel that the author has not sufficiently carried out his good intentions. In the chapter on metamorphic rocks a popular account might have been given of recent researches in the Highlands, and then perhaps the author would not have remarked that "rarely a reversed-fault is seen."
H. B. W.

Sound, Light, and Heat. By Thomas Dunman.
Electricity and Magnetism. By the same Author. (London: Ward, Lock, and Co., 1888.)

THESE two books are revised reprints of the articles on the subjects which have already appeared in Messrs. Ward, Lock, and Co.'s well known "Universal Instructor." They have been published in their present form for the convenience of students. The work of revision and expansion has been undertaken by Mr. Chapman Jones, the death of the original author having rendered it necessary for other hands to perform this part of the work.

As might be expected, the books are of a popular character, but their value to students of elementary physics does not in the least suffer on this account. The almost entire absence of mathematical statements makes them suitable for the most elementary students.

The method of treatment is that of the orthodox text-book, and there is very little that calls for special remark. They differ mainly from other elementary text-books inasmuch as they are brought quite up to date, especially in electrical matters. The 300 diagrams which are distributed throughout the text, though not of a high order of excellence, will do much towards enlightening the minds of those who read the books.

Though not designed to suit the syllabus of any examining body, they are well adapted for students preparing for the Science and Art Department examinations.

Sea-side and Way-side. By Julia McNair Wright. (Boston: D. C. Heath and Co., 1888.)

THIS little volume is the first of a series of "Nature Readers," intended for the use of beginners in reading. As a rule, the authors of reading-books take little trouble to excite the interest of children. Their object is to bring together a number of simple sentences, and they seem to be indifferent whether the sentences express sense or nonsense. In the present series an attempt will be made to